



Integrated Program Review

FY 2016 - 2017

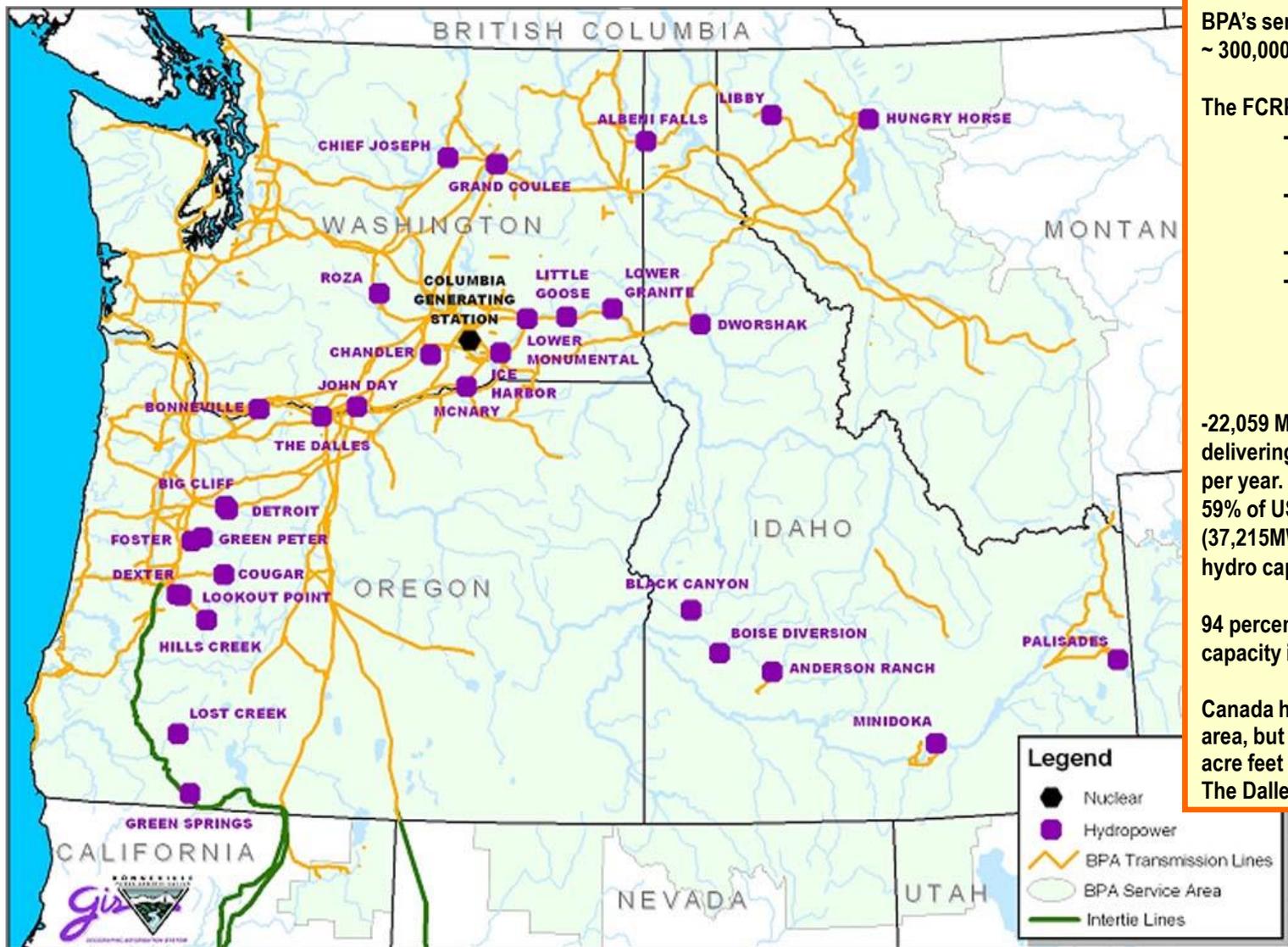
CORPS / RECLAMATION

OPERATIONS AND MAINTENANCE EXPENSES

June 19, 2014



Federal Columbia River Power System Generation & Transmission – System Map



BPA's service area:
~ 300,000 sq. miles

The FCRPS: 31 plants

- 21 Corps Projects (14,651 MW's)
- 10 Reclamation Projects (7,807 MW's)
- 209 turbine-generating units
- Generating units range in size from 1 MW (Boise Diversion) to 805 MW (Grand Coulee)

-22,059 MW of nameplate capacity, delivering power worth about \$4 billion per year. Note: The FCRPS is about 59% of US federal hydro capacity (37,215MW), and 29% of US national hydro capacity (74,872MW).

94 percent of the FCRPS generating capacity is in 12 projects

Canada has 15% of basin area, but provides 30% of 34 million acre feet (maf) average annual flow at The Dalles

Program Description and Strategic Objectives

- Program Description:
 - U.S. Army Corps of Engineers, Bureau of Reclamation, and Bonneville Power Administration work together to provide and implement funding for operations and maintenance activities, non-routine extraordinary maintenance projects, and Fish and Wildlife and Cultural Resources mitigation activities at 31 hydroelectric facilities throughout the Northwest.

- Strategic Objectives:
 - S2: FCRPS Operations & Expansion

 - S7: Environment, Fish & Wildlife

 - I4: Asset Management

Key Products and Outputs

- Key Products and Outputs:
 - 8,800 aMW of generation provided to the northwest valued at nearly \$4 billion.
 - Reliable Generation and Transmission System Performance through voluntary compliance with WECC/NERC Reliability Standards.
 - Safe Work Environments/focus on safety at the Generating Facilities (Complying with new standards for Arc Flash, Lockout/Tagout, Hydraulic Steel Structure Inspections, Asbestos, Emergency Management Systems, etc.).
 - Compliance with Biological Requirements for Fish Passage and Clean Water, and Cultural Resources Section 106 requirements.
 - Avoidance/minimization of CO2 emissions
 - Support for the integration of wind and renewables

O&M Program Overview

- Approximately 1,600 employees: salaries and benefits, and materials and supplies related costs are 70 to 75% budget.
- The O&M program includes funding for mitigation activities:
 - **About 15%** of O&M program costs are **Fish and Wildlife O&M** for screens, hatcheries, fish bypass facilities, trap and transport, etc.
 - **About 2%** of O&M program budget is for the **FCRPS Cultural Resource** program and mitigation activities associated with Section 106 compliance
- **About 17%** of O&M program costs are for Non-Routine Extraordinary Maintenance (NREX), the large infrequent repair activities associated with failed or failing equipment, as well as the Grand Coulee Third Powerplant Overhaul.
- Other programs include Dam Safety, Clean Water, Water Management, Employee Safety, Engineering, Contracting, Physical and Cyber Security, Reliability Compliance and other Support Services.
- The program is implementing industry best practices for O&M through independent outside peer reviews of all functions at the generating plants and by participating in hydro benchmarking forums.

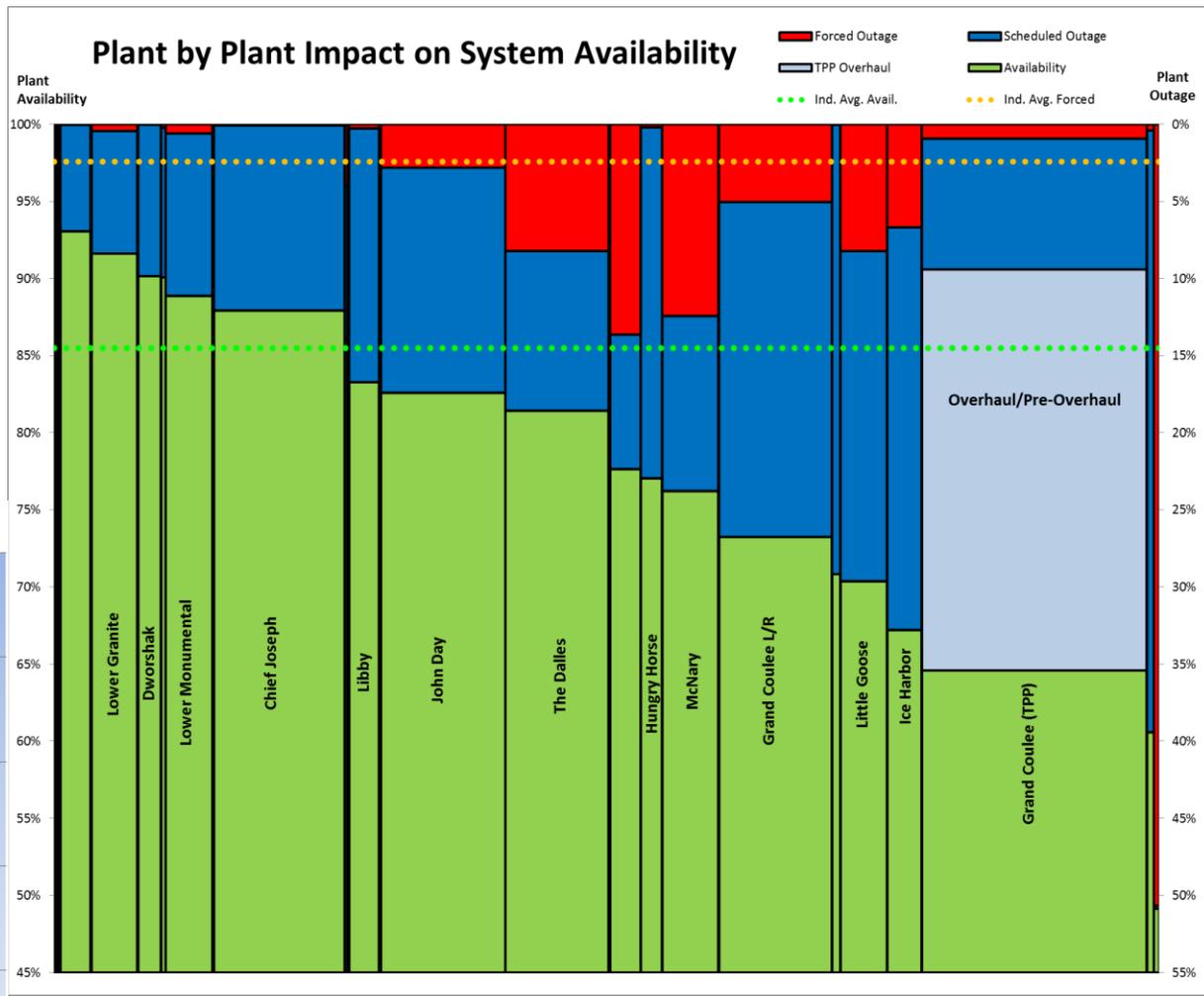
FY 2013 EOY FCRPS Hydro Performance Summary

Current Score			FY13 Strategic Performance Indicators			Target Thresholds		
FCRPS	Reclamation	Corps	Measure			Stretch	Mid	Min
0.90	0.37	1.16	Lost Time Accident Rate			1.5	1.7	2.0
<100%	100%	<100%	Generation System Reliability			100%	N/A	N/A
94.0%	92.3%	95.0%	O&M Expenditure rate			94% - 96%	92% - 98%	90%-100%
102.3%	102.9%	102.0%	Planned Generation Capacity Part A			98%	N/A	N/A
77.7%	74.2%	79.4%	Planned Generation Capacity Part B			75%	66.7%	58.3%
86.3%	98.6%	83.5%	Capital Budget Expenditure Rate			95%	90%	85%

Current Score			FY13 Tactical Performance Indicators			Target Thresholds		
FCRPS	Reclamation	Corps	Measure			Stretch	Mid	Min
99.4%	102.2%	98.1%	Capital Forecast Expenditure Rate			95%	85%	75%
71.7%	85.7%	69.5%	Capital Milestone Completion Rate			95%	85%	75%
On Track		On Track	Incremental Efficiency Gains	Corps	2	1	N/A	
Mid Target Met	On Track	Mid Target	Cultural Resources Stewardship Part A	Corps	12	6	4	
				REC	2	1	N/A	
Mid Target Met	Mid Target Met	On Track	Cultural Resources Stewardship Part B	Corps	3 Districts	2 Districts	1 District	
				REC	2	1	N/A	

Current Score			FY13 Operational Performance Indicators			Target Thresholds		
FCRPS	Reclamation	Corps	Measure			Stretch	Mid	Min
77.8%	68.4%	82.6%	Weighted Availability Factor	FCRPS/Rec/COE	81.1/72.7/85.4	76.7/68.5/81.0	74.1/65.7/78.4	
3.69%	2.10%	4.50%	Weighted Forced Outage Factor	FCRPS/Rec/COE	1.7 / 0.6 / 2.3	3.0 / 1.3 / 3.9	3.9 / 1.8 / 5.0	
95.3%	95.5%	95.3%	Critical PM Rate	(Quarterly)	98%	90%	85%	
95.5%	96.0%	95.4%	PM Completion Rate	(Quarterly)	90%	85%	80%	
87.0%	94.4%	85.3%	Completion of Work			90%	83%	75%
99%	100%	99%	Operations Coordination			100%	95%	90%
274.6		274.6	Fish Screen Reliability	COE Only	250	350	450	
99.9%	100%	99.9%	HydroAMP Powertrain & Ancillary			100%	N/A	N/A

FCRPS Availability Over Time and By Plant



Trends in Weighted Availability Factor



O&M Program FY 2016-2017 Program Objectives

- Low cost, reliable power and trusted stewardship:
 - *“Through Operational Excellence, operate and maintain the hydro generation system to maintain reliability and availability while making reliability investments, in preparation for the Grand Coulee Third Power Plant overhauls”.*
 - *Operational Excellence Initiatives*
 - ✓ *Five Year Forecast for Availability: Working to refine understanding of system performance given required routine maintenance, non-routine maintenance, and long term capital investments across the generating facilities to ensure the long-term optimal execution of the program*
 - ✓ *Incident Reporting and Analysis*
 - ✓ *Power Operations and Maintenance Peer Reviews*
 - Continue to address our Cultural Resources and Fish and Wildlife mitigation responsibilities to enable us to realize the benefits of the low cost hydropower system.

O&M Program FY 2016-2017 Spending Drivers

- Aging Infrastructure / Non-Routine Maintenance

- Compliance
 - Electric Reliability
 - Physical and Cyber Security
 - Environmental
 - Safety

- Staffing and Salaries

- Appropriations – highly variable; depends on Congressional action

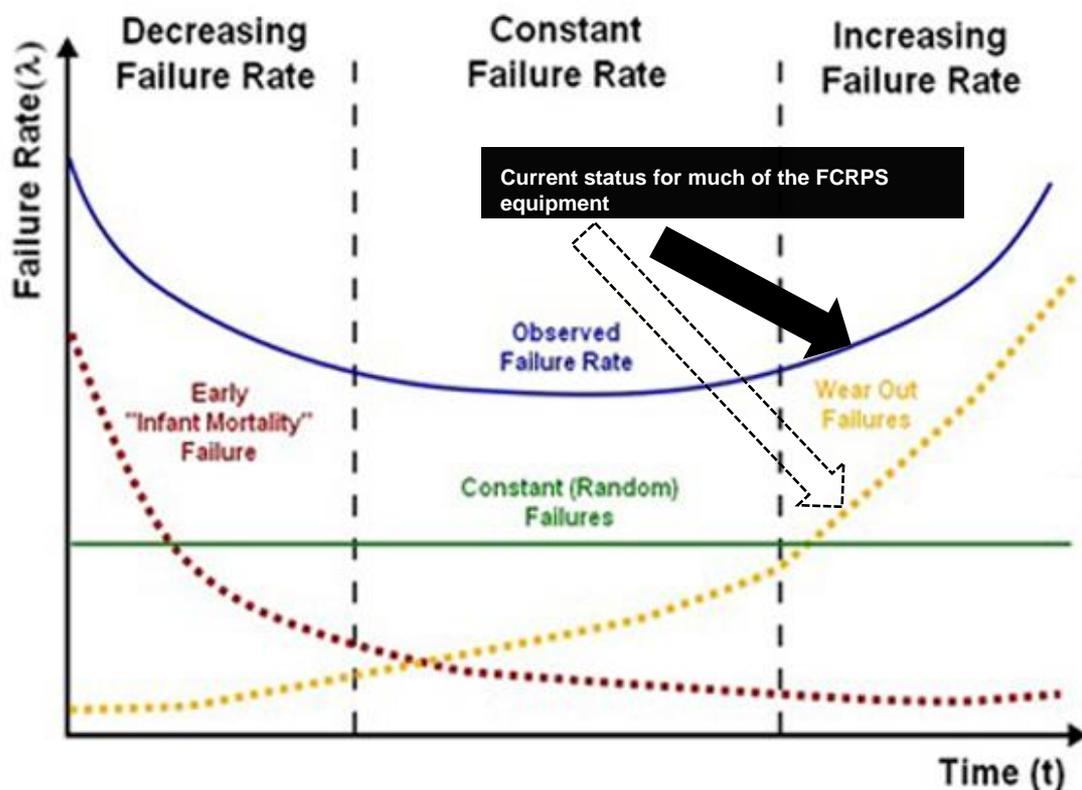
O&M Program FY 2016-2017 Spending Drivers

- Aging Infrastructure / Non-Routine Extraordinary Maintenance (NREX):
 - Aging infrastructure: Average unit age of 50 years, with balance of dam infrastructure as old or older.
 - From 2012 through 2013 the Forced Outage Factor has averaged 3.6% for the system, driven by several long term unit outages. Industry average is 2.4% for large hydro units.
 - Seeing large costs associated with repairing failed generating units across system and significant NREX requirements for spillway gates, penstocks, cranes, etc.
 - Note: NREX costs for returning failed units to service are usually recovered quickly.
 - Grand Coulee G-10 cost \$1.6M to repair, while the average value of generation from the unit is \$4.1M per year.
 - Chief Joseph unit 21 cost \$3M to repair, while the average value of generation from the unit is \$6.8M per year.
 - Grand Coulee G-21 repair cost \$1.5M, while the average value of the lost capacity would be ~\$7.5M per year.
 - Unknown conditions found once repairs begin can have significant costs. GCL TPP overhauls will cost \$3M to \$5M per unit due to additional needed repairs discovered once work began.

O&M Program FY 2016-2017 Spending Drivers (continued)

- Aging Infrastructure / Non-Routine Extraordinary Maintenance (NREX): (continued):
 - \$500M+ in NREX currently planned during 2014-2021, but needs may be higher
 - Unit Reliability
 - Grand Coulee Third Powerplant Mechanical Overhaul
 - BLH turbines at John Day and Lower Snake projects
 - Bonneville 2nd powerhouse – design flaws in thrust collar/runner
 - Mandatory turbine integrity inspections for all Corps projects
 - Transformer refurbishment at John Day
 - Cavitation repair at Lower Granite, Grand Coulee, Hungry Horse
 - Headgate refurbishment at McNary, L. Monumental, and L. Granite
 - Water Control
 - Spillway gate work at Chief Joseph, The Dalles, McNary, Bonneville, and throughout the Willamette Valley
 - Spillway/drum gates at Reclamation projects, including Grand Coulee
 - Penstock gates and coatings
 - Cranes: Left, Right, and Key's Pumping Plant at Grand Coulee
 - Fire Systems: Grand Coulee, Albeni Falls, Palisades
 - Critical Spares

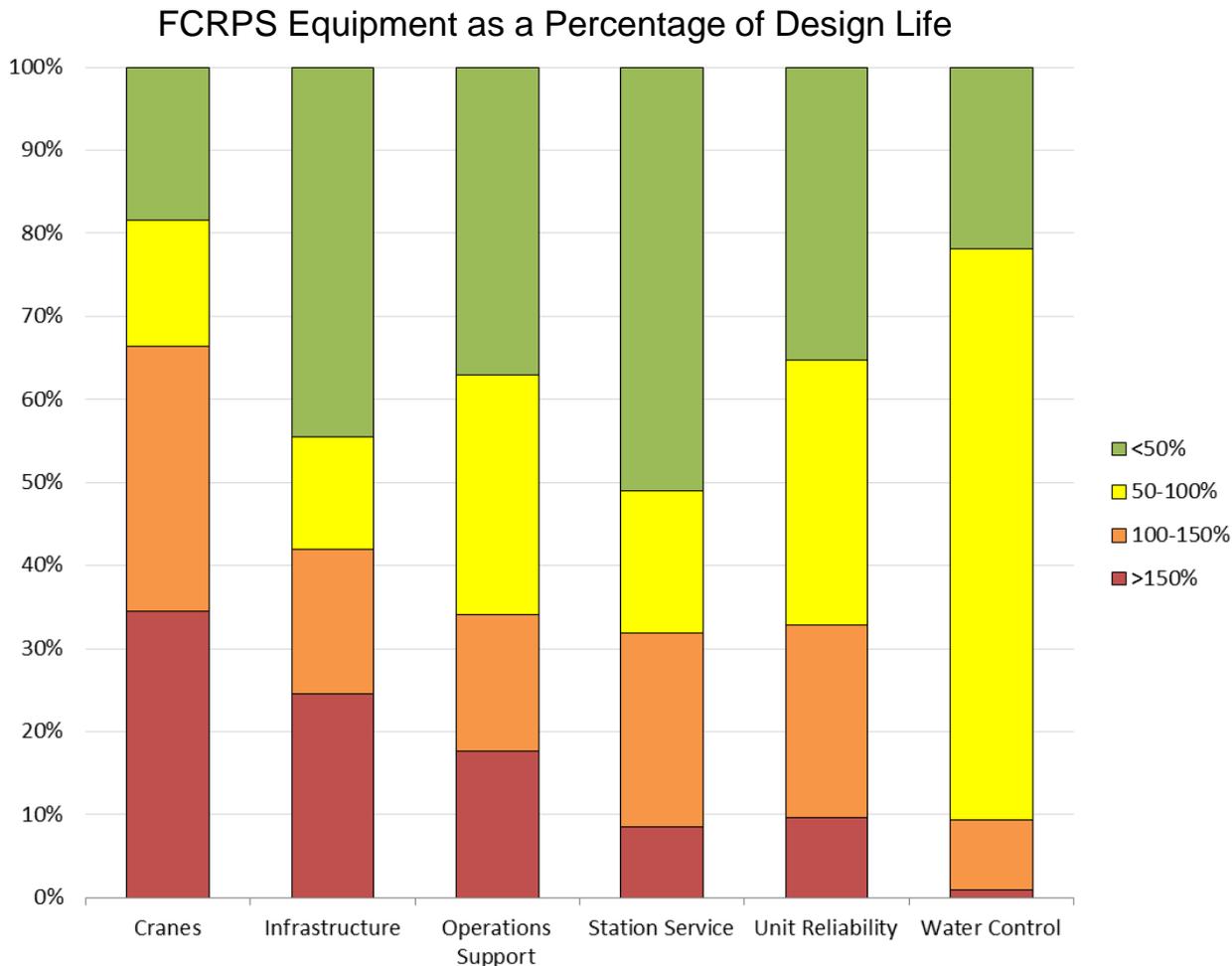
Aging Infrastructure / Non-Routine Extraordinary Maintenance: Equipment Condition Across FCRPS



- 33% of FCRPS equipment has exceeded its design life
- 26% of FCRPS equipment has 'marginal' or 'poor' condition hydroAMP rating
- Average hydroAMP ratings continue to decline

Aging Infrastructure / Non-Routine Extraordinary Maintenance: Equipment Condition

- Majority of equipment is past its' useful life – reflected in declining HydroAMP ratings.
- Aging equipment requires more frequent maintenance, both routine and non-routine.
- Creates a situation of reacting to unplanned forced outages, creating additional demands on staff/OT/contract work.



Aging Infrastructure / Non-Routine Extraordinary Maintenance: hydroAMP Equipment Condition Ratings

Example of a Plant with Capital Investment: McNary

■ Good

- Circuit Breakers – 10 (Replaced 2003)
- Transformers – 9.5 (Replaced 2007-2010)

***Over 8 years:

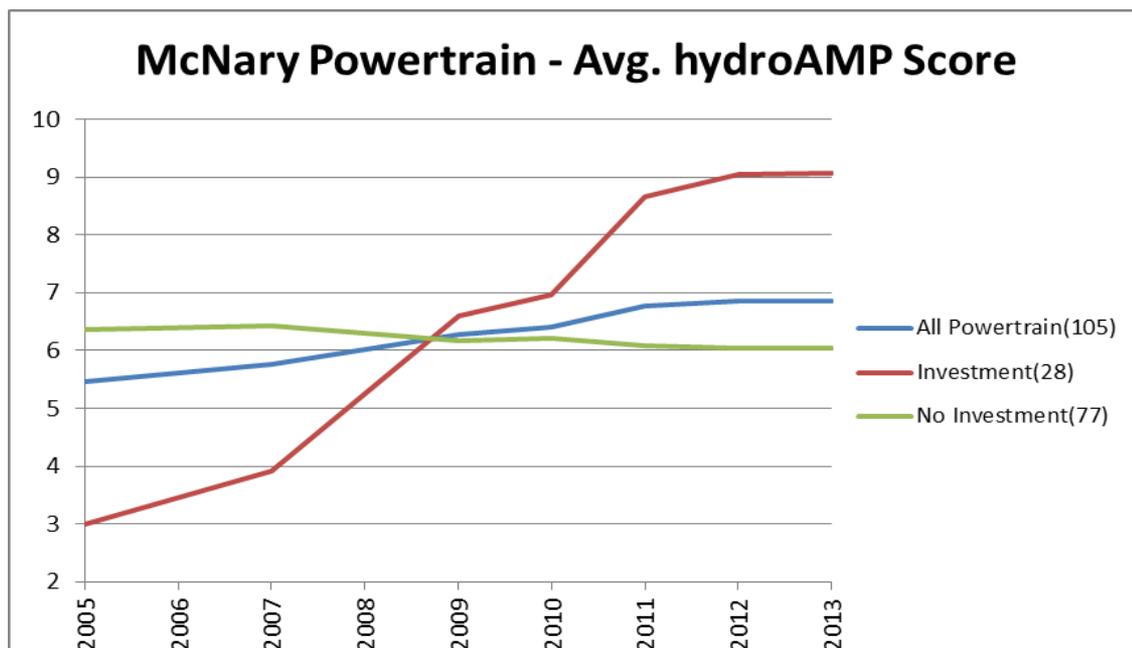
- Components without capital investment have degraded by half a point
- Components with investment have improved six points
- Entire powertrain has improved by 1.4 points

■ Fair

- Generator Stator – 7.0 (Rewinds in progress)
- Generator Rotor – 6.1
- Exciters – 6.0

■ Marginal

- Governors – 4.9
- Turbines – 3.8



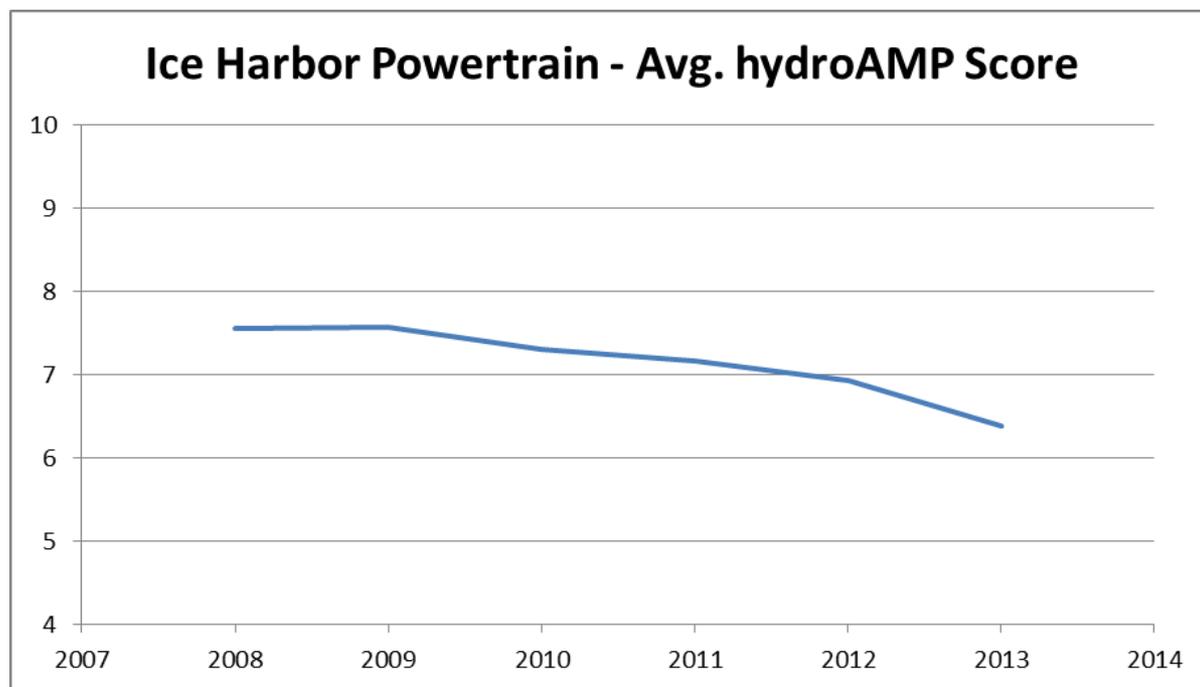
Aging Infrastructure / Non-Routine Extraordinary Maintenance: hydroAMP Equipment Condition Ratings

Example of a Plant without significant investment: Ice Harbor

- Good
 - Circuit Breakers – 10 (Replaced 2004)
 - Transformers – 8.2 (Refurbished recently)
 - Exciters – 8.1 (replaced 2001-2)

****Without much investment at Ice Harbor, equipment condition has degraded a whole point in only five years*

- Fair
 - None
- Marginal
 - Generator Rotor – 5.5
 - Turbines – 4.6
 - Governors – 4.4
- Marginal/Poor
 - Generator Stator – 3.1



O&M Program FY 2016-2017 Spending Drivers (continued)

■ Compliance

• WECC/NERC

- The program continues to see evolving standards, especially Critical Infrastructure Protection (CIP) for cyber security.
 - ✓ The next generation of CIP standards that become effective April 1, 2016 will increase requirements at all Bulk Electric System cyber assets
 - ✓ Resource and implementation costs are expected to increase at all FCRPS facilities
- Additional coordination and agreements, specifically for compliance, between the BPA, the Corps, and Reclamation such as
 - ✓ Inter Control Center Protocol (ICCP)
 - ✓ 3 Agency Non-Disclosure
 - ✓ BlackStart/System Restoration
 - ✓ Delegation
- Routine Audits
 - ✓ NWS completed in April 2013, NWP in August 2013
 - ✓ Approximately 3,000 man-hours were devoted to support each audit. Cost was about \$500K for each
- Future audits
 - ✓ NWW will be audited in 2014
 - ✓ Reclamation in 2015
- Unannounced spot audits by WECC and NERC

O&M Program FY 2016-2017 Spending Drivers (continued)

■ Compliance

● Cyber and physical security threats are increasing.

- Preventative measures are becoming more critical and complex.
- Highly skilled personnel are needed to develop, implement, and manage power plant control systems and other security related programs.
- Additional resources are required as a federal entity to address physical and cyber security requirements such as,
 - ✓ FISMA (Federal Information Security Management Act)
 - ✓ Homeland Security
 - ✓ Department of Energy/Interior
 - ✓ Other Executive Orders

● Environmental Compliance

- The Corps has been sued by Columbia Riverkeeper. In a review of the Clean Water Act, the Dept. of Justice has informed the Corps that we need NPDES permits for point source discharges. This will result in increased costs for permit applications, and labor and equipment for monitoring. Reclamation may be required to have NPDES permits as well.
- Appropriations started funding CRFM O&M in FY2014. For the foreseeable future, it is expected this will be about a \$4M annual match from the power budget.

● Safety

- An increased emphasis on safety requires additional measures and a more rigorous and robust program. Emphasis on JHA's and following FIST 1 or other applicable standards.

● Cultural Resource

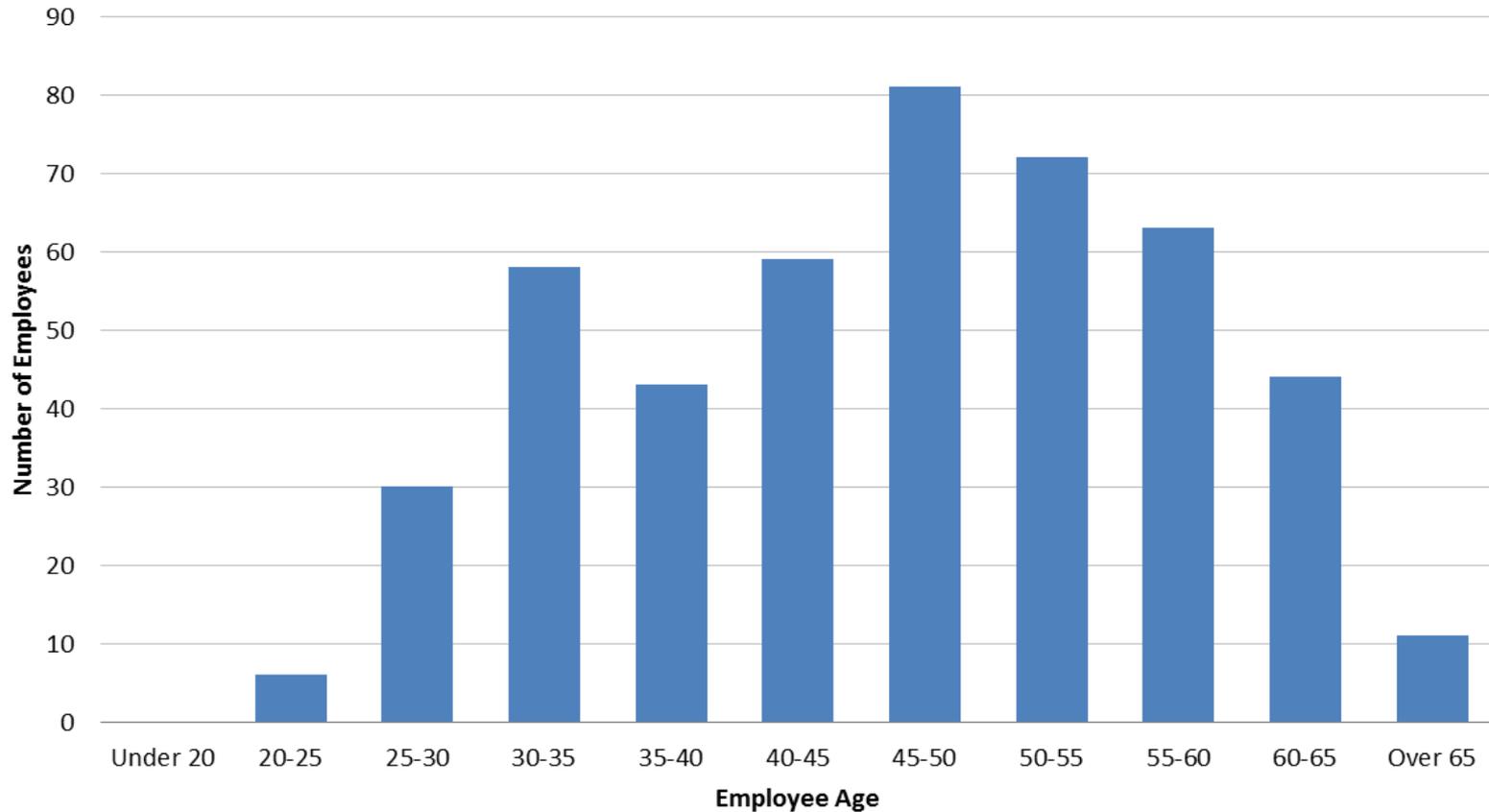
- Mitigation requirements have increased as the program has moved from inventorying to mitigation (resolving adverse effects).
- Additional resources needed to execute the program and ensure National Historic Preservation Act and section 106 compliance.

O&M Program FY 2016-2017 Spending Drivers (continued)

■ Staffing/Salaries:

- Reclamation has implemented the staffing plan for 43 additional staff at Grand Coulee that was approved in the last IPR. The staffing levels reflect recommendations from a third-party review assessing industry best practices.
 - Grand Coulee has hired 29 of the approved staff level of 43 – will be fully staffed by the start of FY 2015
- Retaining qualified staff
 - Over the last ten years Grand Coulee has had a turnover rate of 50 staff per year. Relocation costs and training at Grand Coulee are up to \$3.75M per year
- Corps trades and crafts employees were subject to a wage freeze along with all Federal GS employees. Now that the freeze has lifted, T&C wages are being realigned with prevailing rates based on a regional survey of the hydropower industry. The average increase is about 5.9% which equates to \$1.7M in additional funding for wages in FY14 and about \$5M additional funding for wages each year in FY15 and beyond
- For Reclamation, the Trades and Crafts salaries are negotiated or surveyed at the prevailing regional rate which will be 3.0+ percent for 2014

Staffing/Salaries: Grand Coulee Age Profile - Typical of the FCRPS



O&M Program FY 2016-2017 Spending Drivers (continued)

- Appropriated Expenses:
 - This amount is variable and depends on priorities in the Appropriations, but needs to be covered as an in-year expense.
 - An example of this type of cost would be an emergency repair of a joint project feature associated with the dam structure that congress makes a high priority.
 - For Example, in 2009 the Corps had \$5.9M in appropriated expenses and accounting cost reversals that had to be incorporated into the program that year.
 - Joint feature funding is related to congressional budget priorities.

FCRPS Hydro Program Challenges

- The age and condition of the facility and equipment are driving:
 - Additional maintenance work
 - Longer maintenance outages
 - Higher risk of forced outages
- Given BPA's capital funding constraints, additional pressure is put on the expense program to fund non-routine maintenance activities to repair equipment in poor condition instead of replacing it
- With the projected capital investment program, equipment condition will continue to require a higher level of maintenance
- O&M staffing levels in the proposed budgets are essential to maintain overall facility performance.
- Recruiting and retaining qualified staff.

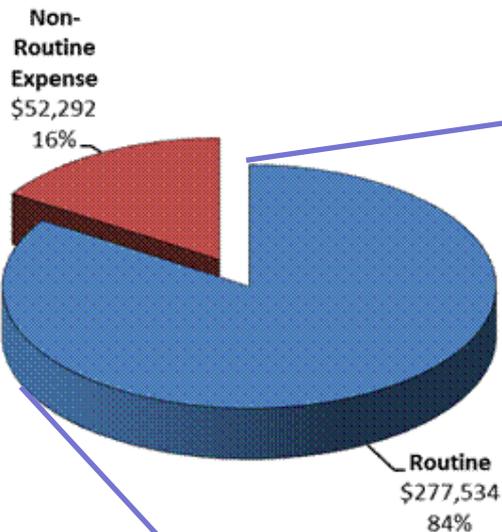


FY2014-2015 Corps and Reclamation O&M IPR Program Funding Levels



FY 2013 O&M Expense Cost by Category

FCRPS Expense Program Breakout



FCRPS Routine Expense Breakout

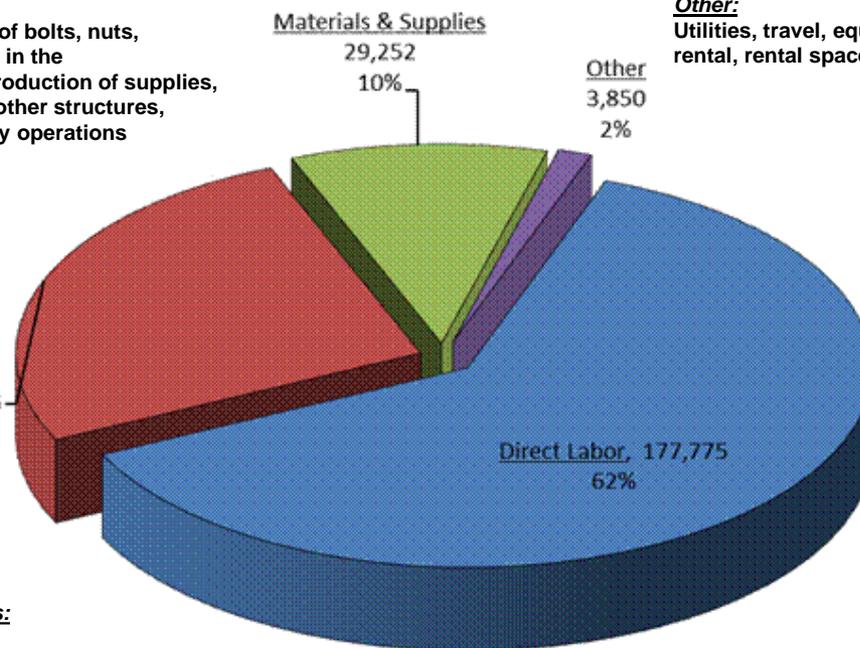
Materials & Supplies:
 Non-capitalized supplies of bolts, nuts, materials, and parts used in the construction, repair, or production of supplies, equipment, building and other structures, etc. used in the day-to-day operations of the facilities.

Support Services & Contracts:
 Fish transport contracts, guard services, water management, professional and technical services, buildings and grounds maintenance, etc.

Support Services and Contracts:
 Fish transport contracts, guard services, water management, professional and technical services, buildings and grounds maintenance, etc.

Direct Labor:
 Salaries and Benefits and indirect overhead labor, Regional and Area office administrative staff costs for legal, payroll, IT, finance, etc.

Other:
 Utilities, travel, equipment rental, rental space, etc.



Corps FY 2014-15 O&M Program Funding Levels

(\$ Thousands)	Actuals	Rate Case		Proposed IPR		
	2013	2014	2015	2015	2016	2017
Corps of Engineers	208,096	225,687	231,878	231,878	243,885	250,981
Grand Total	208,096	225,687	231,878	231,878	243,885	250,981

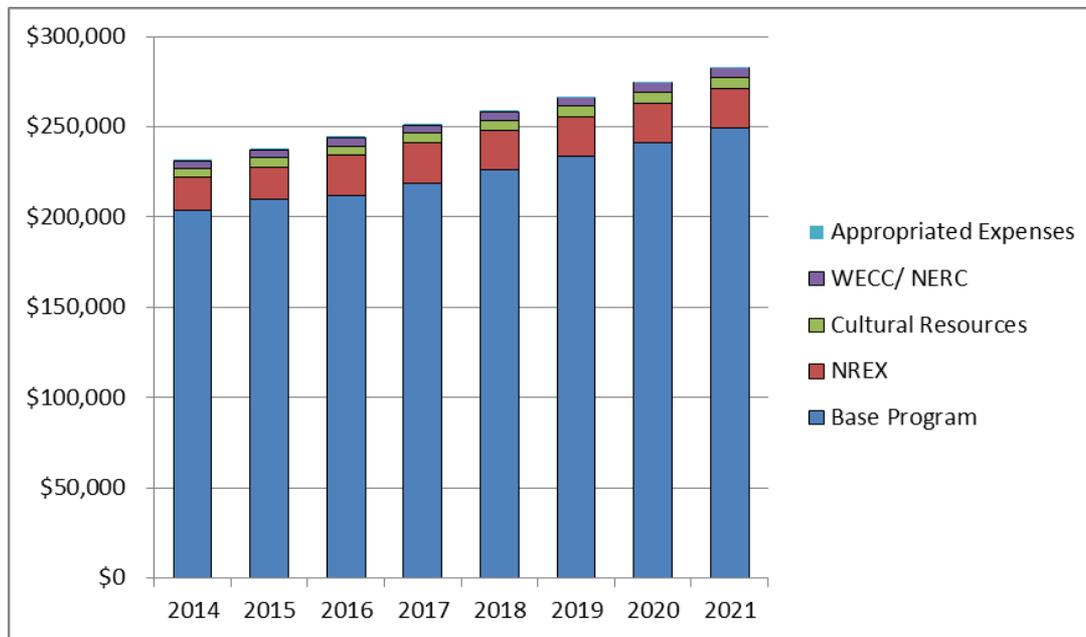
■ Corps Baseline Budgeting Process:

Proposed spending levels for the Corps of Engineers (Corps) are consistent with levels identified in the 5-year O&M budget plan as presented in the 2012 IPR and confirmed through a rigorous baseline budgeting process. These processes determine the minimum funding required to meet operating reliability and performance requirements.

- Establish the minimum funding level required for routine Power and Joint Programs at Hydropower Projects, no contingencies are built in.
- Provide justification for the budget request for BPA's Integrated Program Review.
- Informs the Annual Power Budget Development for subsequent fiscal years.
- Provides a common platform to construct and compare budgets across the FCRPS.
- Provide a consistent and uniform approach for Corps' budgets.
- Does not address non-routine or cyclical, non-annual needs of less than \$250K.

Corps Operations and Maintenance Expense Budget For FY2014-2021

Budget w/ Undistributed Reduction	FY	Budget	WECC/ NERC	Cultural Resources	NREX	Base Program	Appropriated Expenses
\$225,687	2014	\$231,187	\$4,244	\$5,207	\$18,000	\$203,736	\$500
\$231,878	2015	\$237,378	\$4,371	\$5,287	\$18,000	\$209,720	\$500
	2016	\$243,885	\$4,502	\$5,369	\$22,000	\$212,014	\$500
	2017	\$250,981	\$4,637	\$5,453	\$22,000	\$218,891	\$500
	2018	\$258,510	\$4,776	\$5,617	\$22,000	\$226,117	\$500
	2019	\$266,266	\$4,920	\$5,785	\$22,000	\$233,561	\$500
	2020	\$274,254	\$5,068	\$5,959	\$22,000	\$241,227	\$500
	2021	\$282,482	\$5,220	\$6,138	\$22,000	\$249,124	\$500



Corps O&M Expense Budget Pressures

The Corps baseline budget process defines minimum funding levels to maintain system capabilities. Despite identifying increased costs in the FY2016-2017 rate case above what we had identified in the FY2014-2015 IPR, the Corps is proposing to maintain our budget requests and not ask for additional funding due to regional economic conditions.

- Starting in FY2014, CRFM O&M is being funded at the appropriations level that requires a power match. The FY14 need is \$4.1M; we expect similar funding levels for CRFM O&M in future years.
- After the Corps' wage freeze from 2010-2014 was lifted, T&C labor costs were adjusted to regional prevailing wage levels. T&C wages will increase an average of approximately 5.9% starting in June of FY2014, requiring an additional \$1.7M in labor funds for FY2014, and about \$5M per year for FY2015 and beyond.

The Corps took a \$5.7M per year reduction in the '12-'13 rate period and was requested to take an \$5.5M per year reduction in the '14-'15 rate period, agreeing to defer non-routine maintenance into future rate periods. Pushing this work out creates a bow wave of delayed work activities that will need to be addressed to maintain reliability, and also increases risk of maintaining reliable system performance with reduced funding.

CORPS Budget Drivers

- **Aging Equipment and Infrastructure / Non-Routine Extraordinary Maintenance**
 - Aging infrastructure has increased non-routine maintenance requirements and decreased the availability of the generations facilities
 - 29% of unit reliability equipment has exceeded its design life
 - 26% of all equipment has a 'marginal' or 'poor' condition
 - Average hydroAMP ratings continued to decline from FY08-13
 - NREX budget need has significantly increased in recent years. Budget limitations in FY12-13 resulted in deferring some non-routine maintenance.
 - Bonneville 2 Powerhouse has had several long term forced outages associated with the generators and a systemic problem has been identified with those units. These failures have decreased the availability factor by 15% over the past ten years and are a significant risk as far as possibly requiring non-routine maintenance funding to address the problem.
 - There have been multiple forced outages of John Day turbines due to blade linkage/pin failures. This is a design flaw that had been previously identified elsewhere on this family of units. These failures have increased the forced outage rate for the plant, and because of the size of the units, had a significant impact on the system availability factor. This design flaw also impacts Snake river plants.

CORPS Budget Drivers (continued)

■ Compliance

● Electric Reliability - WECC/NERC Compliance

- The Corps' program is very lean. Only one individual in each district supports requirements full time. Division and project personnel handle as 'other duties as assigned'.
- Requirements and standards continue to develop

● Physical and Cyber Security

- Corps projects must adhere to Department of Defense requirements.
- DoD audits at five facilities found physical and cyber security incomplete at two.
- Addressing requirements will require a mix of capital and expense, and place additional workload on staff.

● Environmental Compliance

- The Corps has been sued by Columbia Riverkeeper. In a review of the Clean Water Act, the Dept. of Justice has informed the Corps that we need NPDES permits for point source discharges. This will result in increased costs for permit applications, and labor and equipment for monitoring.
- Appropriations started funding CRFM O&M in FY2014. For the foreseeable future, it is expected this will be about a \$4M annual match from the power budget.

● Safety

- An increased emphasis on safety requires additional measures and a more rigorous and robust program. Emphasis on JHA's and following FIST 1 or other applicable standards.

● Cultural Resource

- Mitigation requirements have increased as the program has moved from inventorying to mitigation (resolving adverse effects).
- Additional resources needed to execute the program and ensure National Historic Preservation Act and section 106 compliance.

CORPS Budget Drivers (continued)

■ Staffing and Salaries

- Nearly two-thirds of our routine budget is for labor.
- Attracting and Retaining staff at our projects has been especially challenging.
 - We are ramping up a Hydropower Intern Program, which employs in-school engineering students at our projects in a multi-year program, with the intent of hiring the students as full time employees upon graduation. The cost of this program is about \$1.5M a year.
- Remote projects typically struggle to maintain staff, which puts pressure on existing staff to maintain the routine work load. Growing non-routine extraordinary maintenance adds to the demands placed on staff. Bottom line – personnel are spread pretty thin at most projects and several plants have significant deficits in staffing.
- Historically, budget increases for wages haven't kept up with inflation.

Reclamation FY 2014-15 O&M Program Funding Levels

(\$Thousands)	Actuals	Rate Case		Proposed IPR		
	2013	2014	2015	2015	2016	2017
Bureau of Reclamation	127,116	140,601	143,033	143,033	156,818	158,121
Grand Total	127,116	140,601	143,033	143,033	156,818	158,121

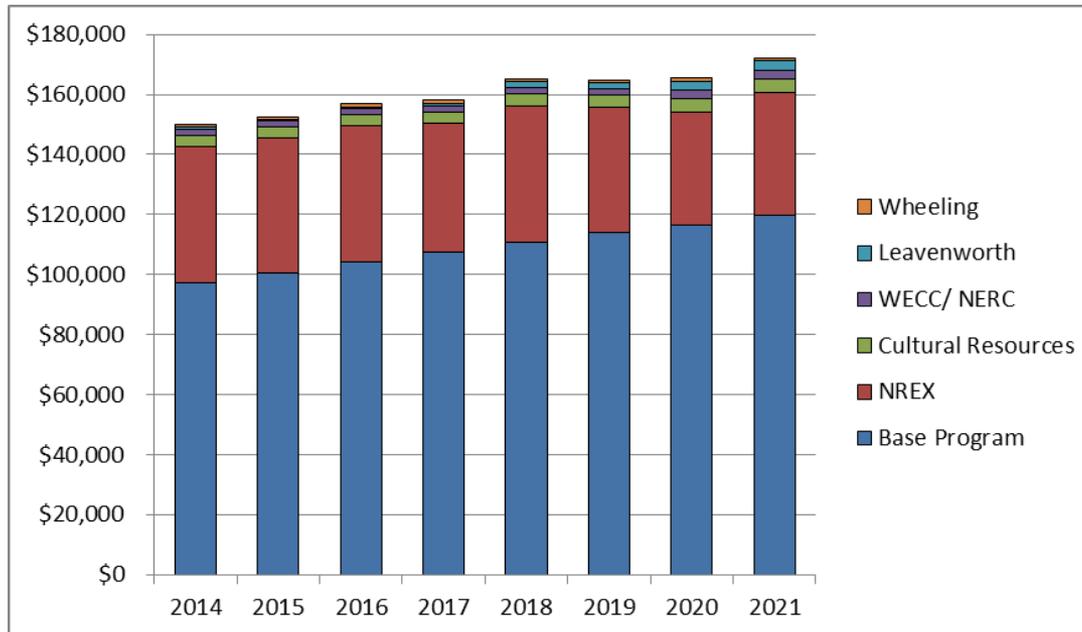
■ Reclamation Baseline Budgeting Process:

Similar to the Corps, proposed spending levels for the Bureau of Reclamation are consistent with levels identified in the 5-year O&M budget plan as presented in the 2012 IPR and confirmed through a rigorous baseline budgeting process. These processes determine the minimum funding required to meet operating reliability and performance requirements.

- Establish the minimum funding level required for routine hydropower program, no contingencies are built in.
- Provide justification for the budget request for BPA's Integrated Program Review.
- Informs the Annual Power Budget Development for subsequent fiscal years.
- Provides a common platform to construct and compare budgets across the FCRPS.

Reclamation Operations and Maintenance Expense Budget For FY2014-2021

Budget w/ Undistributed Reduction	FY	Budget	WECC/ NERC	Cultural Resources	NREX	Wheeling	Base Program	Leavenworth Appropriated Expenses
\$140,601	2014	\$150,101	\$1,767	\$3,645	\$45,502	\$1,000	\$97,262	\$925
\$143,033	2015	\$152,533	\$1,813	\$3,758	\$45,024	\$1,000	\$100,438	\$500
	2016	\$156,818	\$1,860	\$3,874	\$45,260	\$1,000	\$104,278	\$546
	2017	\$158,121	\$1,913	\$3,993	\$42,902	\$1,000	\$107,313	\$1,000
	2018	\$165,297	\$1,968	\$4,114	\$45,586	\$1,000	\$110,629	\$2,000
	2019	\$164,822	\$2,023	\$4,239	\$41,610	\$1,000	\$113,950	\$2,000
	2020	\$165,493	\$2,864	\$4,367	\$37,764	\$1,000	\$116,498	\$3,000
	2021	\$172,081	\$2,950	\$4,498	\$40,731	\$1,000	\$119,902	\$3,000



Reclamation O&M Expense Budget Pressures

Reclamation budget process defines minimum funding levels to maintain system capabilities. Despite identifying increased costs in the FY2016-2017 rate case above what we had identified in the FY2014-2015 IPR, Reclamation is proposing to maintain our budget requests and not ask for additional funding due to regional economic conditions.

- Additional non-routine maintenance costs due to unforeseen conditions and contract modifications on the Third Powerplant Mechanical Overhaul

Reclamation was requested to take an \$9.5M per year undistributed reduction in the '14-'15 rate period, agreeing to defer non-routine maintenance into future rate periods. Pushing this work out creates a bow wave of delayed work activities that will need to be addressed to maintain reliability, and also increases risk of maintaining reliable system performance with reduced funding.

Reclamation O&M Expense Budget Drivers

- **Aging Equipment and Infrastructure / Non-Routine Extraordinary Maintenance:**
 - Aging infrastructure has increased non-routine maintenance requirements and decreased the availability of the generations facilities
 - 40% of unit reliability equipment has exceeded its design life (47 percent at GC)
 - 26% of all equipment has a 'marginal' or 'poor' condition (30% percent at GC)
 - Average hydroAMP ratings continued to decline from FY08-13
 - Increasing routine maintenance on old equipment.
 - Non-Routine Extraordinary Expense:
 - Grand Coulee Third Powerplant Overhaul. Currently scheduled to be completed in 2022. However, we are evaluating the potential to uprate 19, 20, and 21. If uprated, work would begin in 2018-2019.
 - Major maintenance/repairs related to aging infrastructure and generators (e.g., turbine cavitation repair, turbine overhauls, spillway/drum gates, penstock gates and coatings, crane overhauls, fire systems rehabilitation, Discharge tube and draft tube rehabilitation).
- Delaying non-routine maintenance work activities has created a bow wave that needs to be addressed to maintain reliability.

Reclamation O&M Expense Budget Drivers

Aging Equipment and Infrastructure / Non-Routine Extraordinary Maintenance: Third Powerplant Overhaul Program

■ Grand Coulee Generator G24 Status

- Generator G24 overhaul was started in March 2013 and was scheduled to return in September 2014
- Schedule delays
 - Stop work orders issued in 2013 due to shaft uncoupling and asbestos encountered in gasket materials
 - Wicket Gate Condition: in late 2013 found extreme wear in the upper and lower stems, requiring extra work to refurbish, amounting to 162 days and \$1.3 million Contract Modification.
 - Other Contract Modifications required extra work for various machining of mechanical surfaces, repairs to operating ring defects, additional coating and surfacing repairs, and other.
- Present schedule shows Generator G24 will be returned to Reclamation in March 2, 2015
- Exploring ways to recover schedule on G24 and incorporating lessons learned to mitigate risk of further delays on Units G22 and G23.

Reclamation O&M Expense Budget Drivers

Aging Equipment and Infrastructure / Non-Routine Extraordinary Maintenance: Third Powerplant Overhaul Program

■ Summary of Contract Modifications for G22-G24

• Wicket Gates*	\$1.3 million
• Servo / Servo Stop Nut	\$450k
• Shaft Seal	\$300k
• Coatings (Scroll case, Turbine Pit)	\$600k
• Machining of various components	\$960k
• Misc. refurbishment	<u>\$900k</u>
Total G24 (assume the same for G22-G23)	\$4.5 million
Total G22-G24 (incl. Operating Ring**)	\$18.0 million

* = Wicket Gate Issues on G24 has caused a 5 + month project delay. Project is considering purchase of new Gates for Units G22-G23 to mitigate this issue. It is expected that new wicket gate design for G22-G23 may show up to a 0.5% efficiency gain, which may be a capital improvement item.

** = Operating Ring on G24 found to be near marginal to reuse; Project is considering purchase of spare Operating Ring(s) to mitigate this issue.

Reclamation O&M Expense Budget Drivers

Aging Equipment and Infrastructure / Non-Routine Extraordinary Maintenance: Third Powerplant Overhaul Program

	FY14	FY15	FY16	FY17	FY18	FY19	FY20	FY21
G22-G24 Overhaul	\$26.5M	\$21.3M	\$26.0	\$16.7				
G19-G21 Overhaul	\$1.2M	\$2.5	\$2.1M	\$8.4M	\$30.5M	\$26.7	\$22.3M	\$27.0M
Subtotal	\$27.7M	\$23.8M	\$28.1M	\$25.1M	\$30.5M	\$26.7	\$22.3M	\$27.0M
G22-G24 Contract Mods	\$4.0M	\$2.65M	\$5.0M	\$5.4M				
TOTAL	\$31.7M	\$26.5M	\$33.1M	\$30.5M	\$30.5M	\$26.7M	\$22.3M	\$27.0M

- Reclamation has investigated uprating G19-22 from 690 mw to 770 mw.
 - Reclamation and BPA are evaluating the cost effectiveness of the uprate.
 - If G19-21 are uprated, the project would be funded mostly with capital dollars and expense dollars would reduce \$5M to \$10M per year starting in 2017

Reclamation O&M Expense Budget Drivers (continued)

■ Compliance

● Electric Reliability Compliance

- WECC/NERC continuing to issue or develop new standards and requirements
- Addressing new standards requirements will continue to place additional workload on existing staff and require additional funding

● Physical and Cyber Security

- WECC/NERC continuing to issue or develop new standards for Critical Infrastructure Protection (CIP).
- Addressing new CIP standards and requirements will continue to place additional workload on existing staff and require additional funding
- Reclamation must meet to Department of Interior requirements.

● Environmental Compliance

- Reclamation may also need NPDES permits for point source discharge since the Corps has been sued and may need NPDES permits for point source discharges. There will be additional costs for permit applications, and labor and equipment for monitoring
- Aquatic Nuisance Species (zebra and quagga mussels)

● Safety

- An increased emphasis on safety requires additional measures and a more rigorous and robust program. Emphasis on JHA's and following FIST 1 or other applicable standards.

● Cultural Resource

- Mitigation requirements have increased as the program has moved from inventorying to mitigation (resolving adverse effects).
- Additional resources needed to execute the program and ensure National Historic Preservation Act and section 106 compliance.

Reclamation O&M Expense Budget Drivers (continued)

■ Staffing and Salaries

- Trades and crafts employee received raises of 4.9 % (FY09) to 3.0 % (FY11) and received raises of 3.5% for FY12, of 1.5% for FY13, and of 3.0 % for FY14.
- Since the trades and crafts employees were covered by a collective bargaining agreement which was in effect on the date of the Presidential memorandum, they were not affected by the pay freeze.
- This agreement requires that increases be based on a negotiated methodology which requires the surveying (8 Utilities) of prevailing wage rates in the region to determine pay increases.
- About 60% of Reclamation employees are trades and crafts in base program
- Retaining qualified staff
 - Over the last ten years Grand Coulee has had turnover rate of 50 staff/year
 - Relocation costs and training at Grand Coulee are up to \$3.75M per year

Reclamation O&M Expense Budget Drivers (continued)

■ Grand Coulee Staffing Increase

- Reclamation has implemented the staffing plan for additional 43 staff at Grand Coulee that was approved in the last IPR. The staffing levels reflect recommendations from a third-party review assessing industry best practices.
- Staffing increased of 43 staff for
 - Improvement in Operations and Maintenance work
 - Engineering support for Operations and Maintenance
 - Supervision ratio to staff
 - Better maintenance planning/control/purchasing
 - Succession planning/training
- Grand Coulee has hired 29 of the approved staff level of 43 – will be fully staffed by the start of FY 2015

Reclamation O&M Expense Budget Drivers (continued)

Grand Coulee Staffing Status

Planned Action from Prior IPR			
Quantity	Position Title	Date	Status
1	PSCC Foreman 1	2015	Hired
1	PSCC	2015	Hired
1	Electrical Foreman	2015	Hired
1	Lineman	2015	Pending
1	Electrician	2015	Pending
3	Hydromechanic	2015	pending
2	PP Operator	2015	Pending
1	Senior PP Operator	2015	Pending
1	Utilityman (Hungry Horse)	2015	Hired
1	Safety Specialist (Hungry Horse)	2013	Hired
2	Industrial Hygenist	2014	Hired
3	Mechanical Engineers	2014	Hired
3	Electrical Engineers	2014	Hired
2	Engineering Technicians	2014	Hired
1	Engineering Technician	2013	Hired
1	O&M Engineering Supervisor	2013	Hired
4	Supervisor II	2013	Hired
1	CADD Supervisor	2014	Hired
2	Maintenance Management Tech	2014	Hired
2	Power OPS Specilist (SOP's)	2014	Vacant
1	Contract Specialist	2013	Hired
1	Superintendent	2013	Hired
3	Deputy Superintendents	2014	Selected
1	O&M Manager	2013	Hired
1	Training Supervisor	2013	in HR
1	Training Coordinator	2014	in HR
1	Training Specialist	2014	in HR

Risks to FCRPS Hydro Program Performance

- Non routine extraordinary maintenance funding/limiting capital investment:
 - Current FY14 -15 NREX Budgets are almost fully committed for Corps. Reclamation's NREX is fully committed.
 - The Corps and Reclamation took undistributed reductions in the '14-'15 rate period (\$5.5M and \$9.5M per year respectively) , agreeing to defer non-routine maintenance into the '16-'17 rate period. This bow wave of delayed work activities needs to be addressed to maintain reliability.
 - Limiting capital investment further impacts ability to address aging hydro infrastructure and maintain system reliability, and likely will require more maintenance and staff.
- Forced Outage Factors and the resulting Availability have reached a critical juncture with Availability declining because of the advanced age and condition of the equipment. These trends indicate the need for more non-routine maintenance and capital funding. Additional and more frequent/comprehensive preventive maintenance and non-routine repair needs will continue to increase if not addressed.
- O&M budgets reductions jeopardize effective execution of maintenance, impacting Preventative Maintenance (PM) completion rates for critical PMs, reducing equipment performance and reliability, and the ability to respond quickly and efficiently to failures.

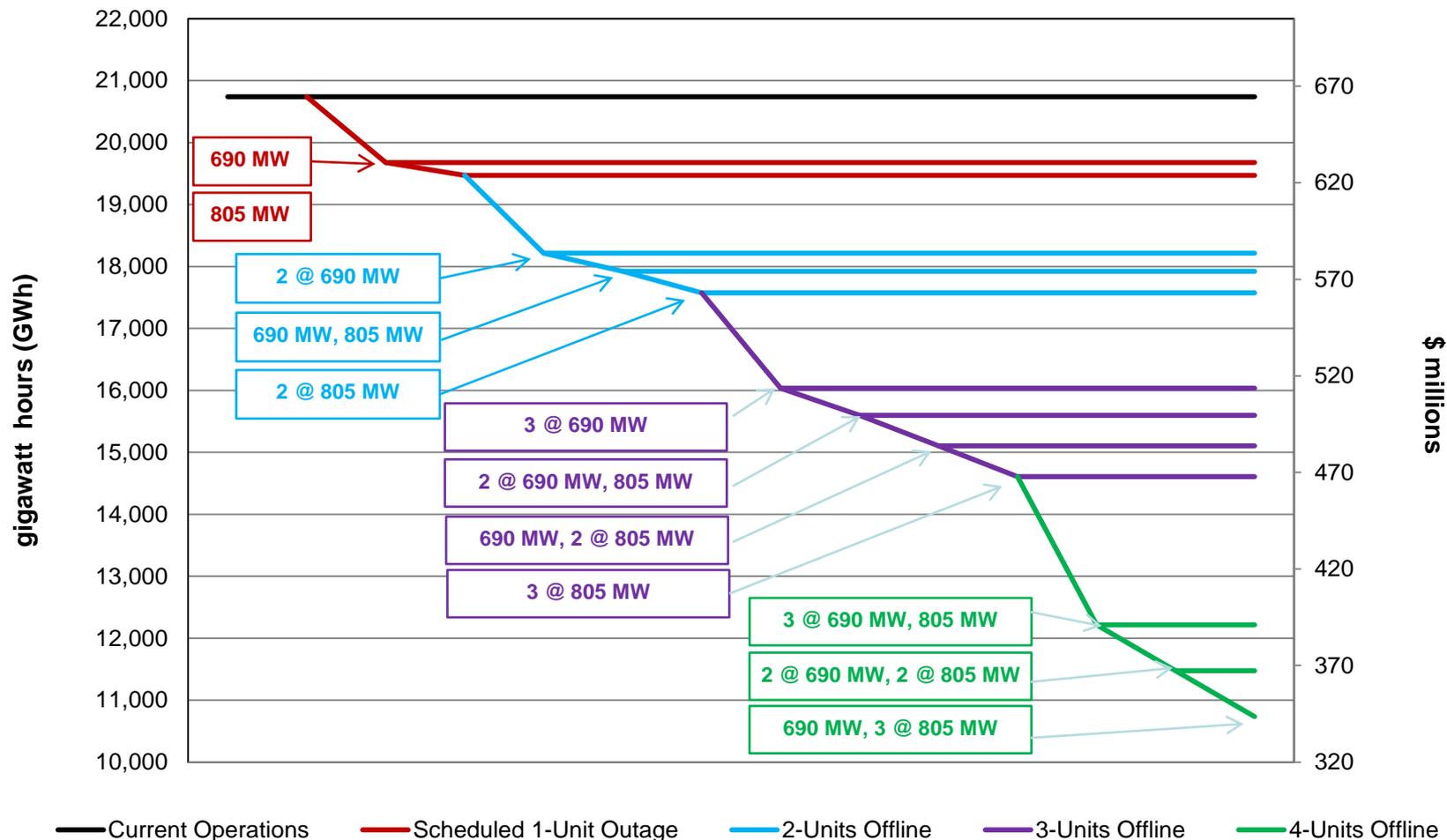
Risks to FCRPS Hydro Program Performance

- Electric reliability compliance must be adequately resourced to ensure system integrity and to prevent violations. We are operating this program with a very lean budget.
- Cyber and physical security assessments and protection measures must be funded to mitigate vulnerabilities to system integrity and resilience. DOD and DOI requirements must be met.
- The Corps is currently planning to obtain NPDES permits and manage the additional costs within our budget. This will put additional strain on the O&M program. Reclamation will most likely also be required to obtain the permits.
- Federal Information Security Management Act:
 - Recent DOI initiatives and DoD IG Audits may lead to additional requirements
 - Department of Army driven Defense Information Assurance Risk Management Framework (DIARMF) Certification of Industrial Control Systems (ICS) Assets.
- FCRPS Commitment to Environmental Stewardship:
 - NPDES Permits
 - BiOp, fish passage, and fish hatcheries
- Aquatic Nuisance Species (zebra and quagga mussels)
- Salaries:
 - The pay re-adjustment for Trades & Crafts employees will put additional pressure on budgets.

Risks to FCRPS Hydro Program Performance

Revenue Impacts Associated with Non-Routine Maintenance

Reduction in TPP Output due to unit outages during 12-year overhaul schedule



* Assumes a baseline availability of 67% at Grand Coulee

* Assumes a 12-year (2014-2025) levelized energy value of \$32/MWh (based on the current forward price curve from BPA's Common Agency Assumptions as of January 2013)
 June 19, 2014

CORPS and Reclamation Appropriations Challenges

- Mitigation Responsibilities:
 - Cultural Resources – The region has approved a level of funding required to meet mitigation responsibilities for the Cultural Resource program, but the appropriated match has been a challenge. This is more of an issue for the Corps.
 - Hatcheries – Many hatcheries for the FCRPS are in need of rehab. Nether the Corps nor Reclamation anticipate increases in appropriated funding for these large ticket items. (ESA, Settlement Negotiations, and Current Mitigation responsibilities).
 - Fish Passage – BiOp requirements are increasing at both mainstem and tributary locations. Appropriated funding for Construction and long term O&M of new or rehabbed facilities is not anticipated to increase.
- Joint Program (Dam Safety, Spillway Gates, Keys Pumping Plant, etc):
 - The appropriated shares of the joint activities are expected to become more difficult to match in the future.

Financial Disclosure

This information has been made publicly available by BPA on June 13, 2014 and contains information not reported in agency financial statements.